

Administrative Rule 34.03.04

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| SUBJECT: FLAMMABLE LIQUID STORAGE AND USE IN BASEMENT LEVEL LABORATORIES | EFFECTIVE DATE: August 20, 2004 |
| REFERENCES: 2003 Seattle Fire Code Chapters 27 and 34 Seattle Building Code NFPA 30 NFPA 45 | SUPERSEDES: Not applicable |
| | FCAB REVIEW DATE: August 17, 2004 |
| NOTICE: Administrative Rules are established per Seattle Fire Code Section 102.8, and they are subject to the Administrative Sections 104.9, Alternate Materials and Methods, 104.8, Modifications and Appendix A, Board of Appeals. | APPROVED: _____ JOHN H. NELSEN, FIRE MARSHAL |

PURPOSE AND APPLICABILITY:

Seattle Fire Code (SFC) Section 3404.3.5.1 prohibits flammable liquid storage in basements. The purpose of this rule is to provide an alternative to this strict prohibition and allow limited quantities of flammable liquids within laboratories located below the ground floor. The rule applies to both new and existing educational, research, analytical and other laboratories where work is performed on a non-production basis.

DEFINITIONS:

Laboratory. A facility where the containers used for reactions, transfers, and other handling of chemicals are designed to be easily and safely manipulated by one person. It is a workplace where chemicals are used or synthesized on a non-production basis.

Laboratory Unit. An enclosed space used for experiments or tests. A laboratory unit can include offices, lavatories and other incidental contiguous rooms maintained for or used by laboratory personnel, and corridors within the unit. It can contain one or more laboratory work areas. It can be an entire building.

REQUIREMENTS:

1. Laboratory units shall be separated from other laboratory units by a one-hour fire barrier. Lab suites or lab rooms/areas without separation by a minimum one-hour fire barrier shall be considered a single laboratory unit.
Exception: For existing laboratory units, the level of compliance with this provision will be determined by the fire code official on a case-by-case basis.
2. Storage and/or use of Class I flammable liquids in basements shall only be allowed when stored or used in laboratories located in buildings that are protected throughout by an approved automatic sprinkler system. The design of the sprinkler system in the basement shall not be less than that required for Ordinary Hazard Group 2 in accordance with NFPA 13 with a minimum design area of 1,500 square feet with no reductions.
Exception: For existing laboratory units, the level of compliance with the sprinkler design criteria will be determined by the fire code official on a case-by-case basis.
3. Mechanical exhaust ventilation shall be provided in the laboratory unit at a rate of not less than 1 cubic feet per minute per square foot of floor area, or six (6) air changes an hour, whichever is greater. The system shall operate continuously and shall include exhaust taken from a point within 12 inches of the floor. The location and arrangement of both the exhaust and inlet air opening shall be arranged to provide air movement across all portion of the floor or laboratory to prevent the accumulation of vapors. Ventilation shall not be recirculated within the laboratory or building if the materials are capable of emitting hazardous vapors. For additional ventilation requirements in laboratories see Department of Planning and Development Director's Rule, Guidelines for Preparation and Review of Building Permit Applications for Laboratory Construction and Laboratory Hood Installation.
4. A secondary power source (standby power) shall be provided to automatically supply electrical power to the mechanical ventilation system in the event of a loss of primary power.
5. Quantities of flammable liquids within individual laboratory units and basement levels shall not exceed the maximum quantities set forth in Table 34.1-A.

TABLE 34.1-A
Maximum Allowable Quantities of Flammable Liquids
in Basement Level Laboratories

| Class of Liquid | Maximum Allowable Quantity per Laboratory Unit (gallons) | Maximum Allowable Quantity per Basement Level[†] (gallons) |
|---------------------------------------|---|--|
| Class I-A | 2 | 10 |
| Class I-B | 30 | 60 |
| Class I-C | 45 | 90 |
| Combination of Class I-A, I-B and I-C | 60 ¹ | 120 ¹ |

[†]Containing not more than the maximum allowable quantity of each individual class.

6. Maximum container sizes and types for flammable liquids in basement level laboratories shall be in accordance with Table 34.1-B:

TABLE 34.1-B
MAXIMUM ALLOWABLE CONTAINER SIZES

| Container Type | Class I-A | Class I-B | Class I-C |
|----------------------------------|------------------|------------------|------------------|
| Glass ¹ | 1 pt. | 1 qt. | 1 gal. |
| Metal or listed approved plastic | 1 gal. | 1 gal. | 1 gal. |
| Safety cans | 1 gal. | 1 gal. | 1 gal. |
| Polyethylene ² | NA | Footnote 2 | Footnote 2 |

¹ Class I-A and I-B liquids are allowed to be stored in glass containers of not more than 4 liters capacity if the required liquid purity, such as American Chemical Society analytical reagent grade or higher, would be affected by storage in metal containers or if the liquid would cause excessive corrosion of a metal container.

² Polyethylene containers in accordance with nationally recognized standards.

7. Flammable liquids in excess of 10 gallons per laboratory unit, regardless of class of liquid or container size, shall be stored in approved flammable liquid storage cabinets in accordance with SFC Section 3404.3.2.1.

8. Quantities of flammable liquids outside of approved flammable liquid storage cabinets shall not exceed amounts necessary for demonstration, treatment, laboratory work and maintenance purposes or 10 gallons per laboratory unit, whichever is less. [SFC 3404.3.4.4]
9. Flammable liquid storage cabinets shall be exhausted in accordance with NFPA 30 to maintain a negative pressure. Cabinet exhaust shall discharge to a safe location outside the building.
10. Flammable liquid storage cabinets shall be seismically braced in accordance with the Building Code.
11. Fire suppression shall be provided in non-metallic ducts serving fume hoods in basement level labs where Class I flammable liquids are used in accordance with SMC Section 510.7.
12. An approved fire suppression system shall be provided in fume hoods in basement level labs where Class I flammable liquids are used.
13. Shelving shall be of substantial construction, adequately braced and anchored, of sufficient depth and provided with a lip or guard to prevent individual containers from being easily displaced.
Exception: Shelves in storage cabinets or on laboratory furniture specifically designed for such use.
14. One or more portable fire extinguisher having a minimum rating of not less than 20-B shall be located not less than 10 feet or more than 50 feet from any Class I flammable liquid storage area.
15. Uses or operations that have the potential to increase volatilization of flammable liquids (such as warming and stirring), shall be performed in an exhausted enclosure or provided with equivalent ventilation control approved by the fire code official.
16. Containers of flammable liquids shall be delivered to and stored at their end-use locations. Centralized distribution and storage rooms/areas, and centralized dispensing are not allowed in basements.
17. The permit holder shall be responsible for monitoring and tracking inventories in each basement to ensure compliance with the above-noted provisions.
18. Basements shall be considered a part of, or a separate control area. Quantities of flammable liquids allowed in a basement shall be limited to maximum allowable quantities per control area (MAQ) without increases for sprinklers or cabinets, even though they are provided. If a control area includes a basement and other floors, then the other floors may utilize the increases, but the quantity in the basement portion shall not exceed the MAQ without increases. For example, if a basement and first floor are a single control area and all flammable liquids are stored in cabinets, the maximum aggregate quantity of Class I-B liquids allowed by SFC Table 2703.1.1(1) is 480 gallons (120 gallons x 2 for sprinklers x 2 for cabinets) – however the maximum quantity allowed in the basement portion is limited to 60 gallons. So, the balance (420 gallons) could be stored on the first floor. Regardless of whether part of, or a separate control area, the maximum quantity allowed in a basement shall not exceed maximum allowable quantities per control area WITHOUT INCREASES.